

New Device Locks Valves

A patent for a rotatable stem and lock has been awarded to DOE. Inventors are Joe Deveney (5163) and Stephen Sanderson (5247). The computer-controlled electromechanical device was part of a larger Safeguards project of protect a plutonium nitrate storage and loadout area of a nuclear fuel reprocessing plant from internal theft or sabotage. The work was done several years ago in Advanced Facilities Design Division under Tom Sellers (5250).

"We designed a closed-loop control system for security and safety," Joe says. "Opening and closing control of the critical valves in a liquid plutonium nitrate sampling and storage system was a weakness in existing systems. So we designed the rotatable stem and lock device to restrict operation of those valves only to those authorized to do so and then only during scheduled operations. Unlocking the device was made possible only during a programmed operational sequence manned by an operator and supervisor, in case of an emergency declared by the operator, or from a remote computer-controlled operator's station."

"There were a number of safeguard innovations in the closed-loop control system," Steve adds. "Here at Sandia we built a full-scale mockup of a portion of a nuclear fuels plutonium storage area. Then we programmed all scheduled activities and designed and developed system hard-

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'Tailor-Made' Lasers Ahead?

First Continuous Wave SLS Laser Demonstrated

Sandia researchers Tom Zipperian, Ralph Dawson (both 1141), and Chuck Barnes (1142) have succeeded in making a tiny semiconductor diode laser from a new kind of material, the strained-layer superlattice (SLS). This marks the first time that SLS material has been used to make a successful continuous-wave solid state injection laser.

The achievement supports the claim that SLS's are versatile, reliable materials that can extend solid state electronics technology far beyond its present range of capabilities. Roger Chaffin, manager of Device Research Department 1140, says, "One of the reasons we pushed ahead with an SLS laser is that it's one of the more difficult devices to build. In other words, if we can build a laser with SLS materials, we can build many other devices."

And an injection laser, which differs from an optically pumped laser in that electrons (instead of photons) provide its driving energy, is the most difficult kind of laser to build.

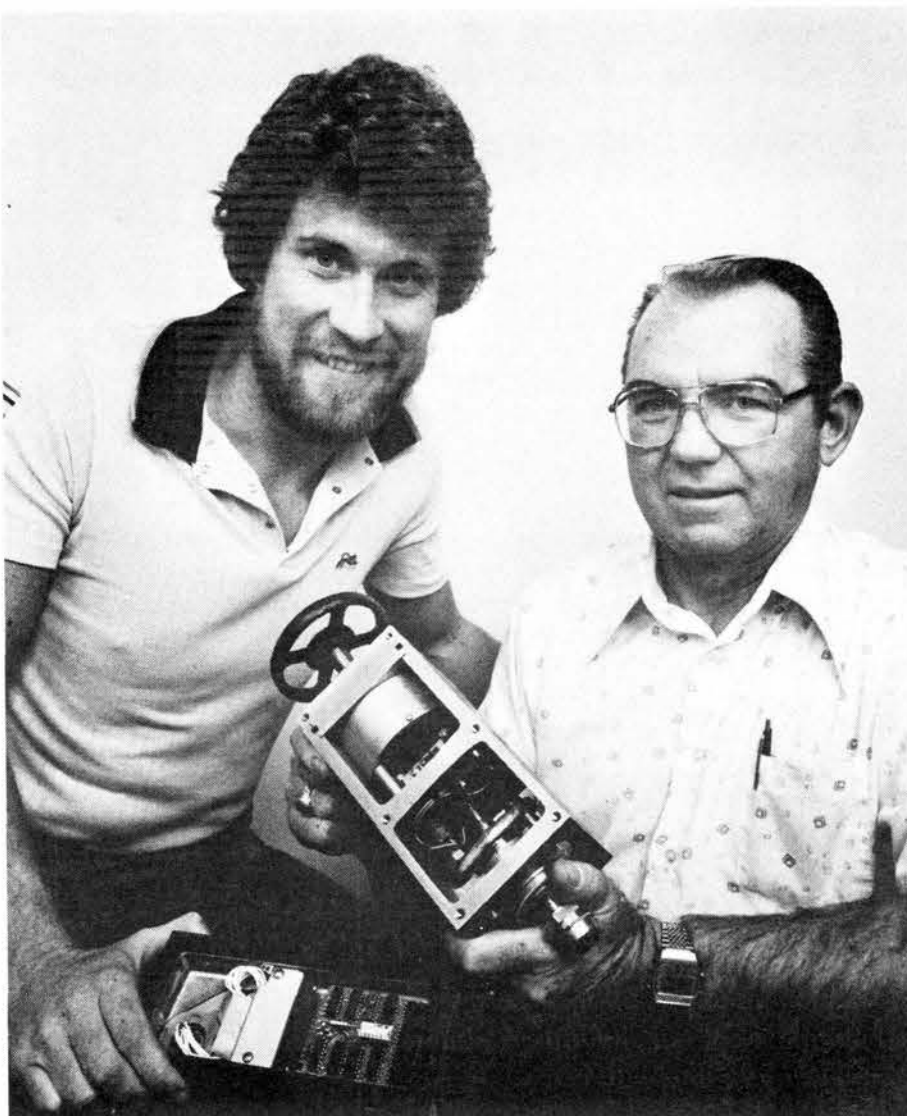
SLS semiconductors, under development at Sandia since 1980 (LAB NEWS, June 12, 1983), have a crystalline quality comparable to pure bulk materials such as silicon or gallium arsenide. They are composed of many alternating layers of different types of ultra-thin crystalline

materials, typically made by the molecular beam epitaxy (MBE) process.

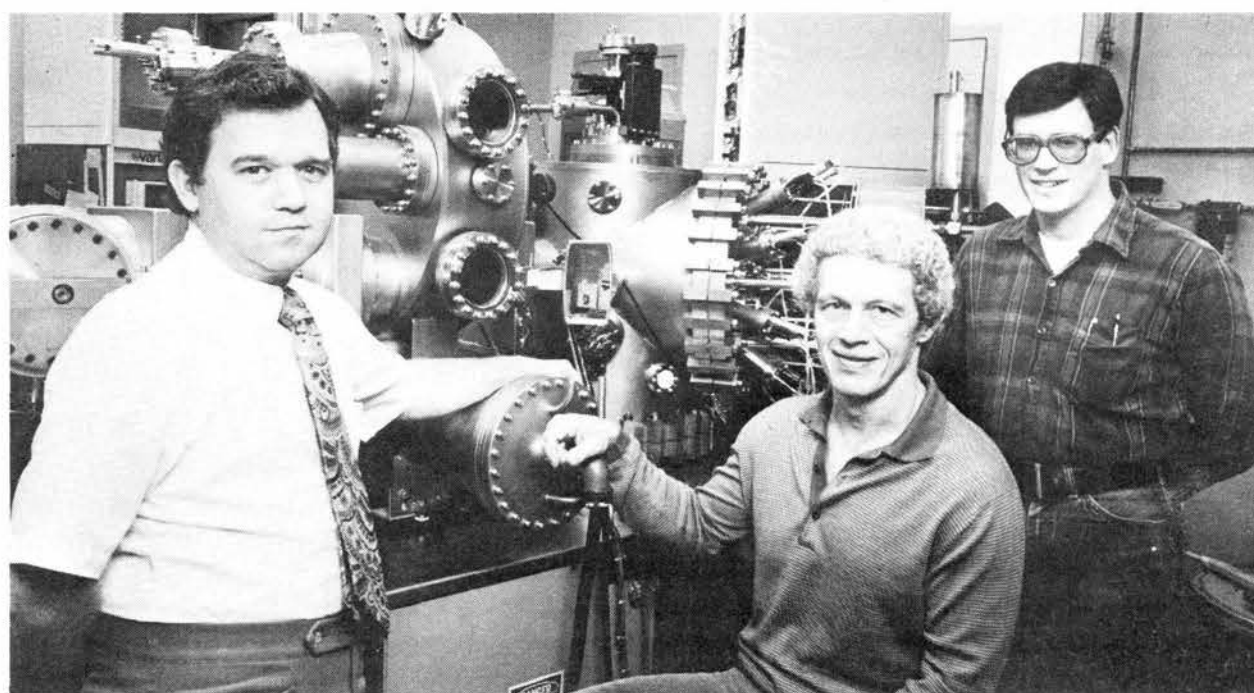
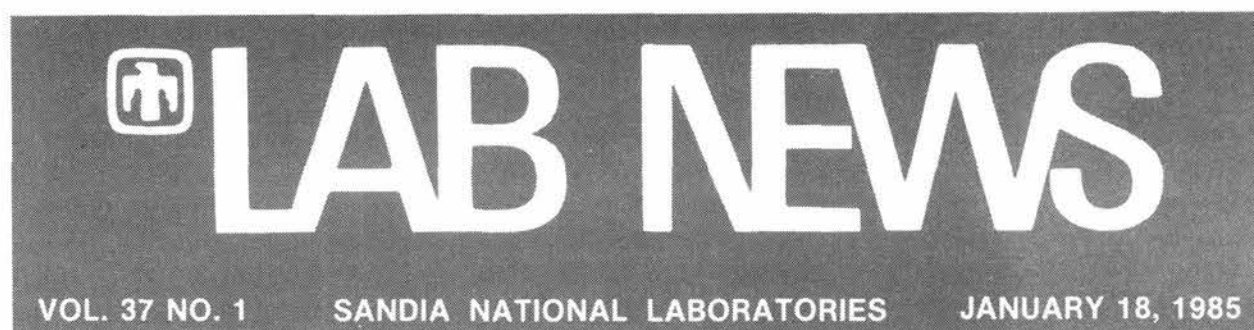
Under normal circumstances the distance between the atoms on one layer is different from the corresponding "atomic spacing" of the next layer, producing imperfections that interfere severely with

the performance of the device. However, the SLS layers are so thin that their atoms align easily by elastic strain during growth. This makes it possible, for the first time, to "tailor-make" semiconductor materials

(Continued on Page Five)



INVENTORS Steve Sanderson (5247), left, and Joe Deveney (5163) display their electromechanical rotatable stem and lock device and its associated electronics, part of a Safeguards system designed for a nuclear fuels processing plant. The device has other applications in the chemical and petrochemical industries.



SLS LASER developers Ralph Dawson (1141), Chuck Barnes (1142), and Tom Zipperian (1141) are the first researchers to make a successful continuous-wave solid state injection laser from a strained-layer superlattice (SLS) material.

Antojitos

So You Think Sandia Doesn't Care About You! There are those among us who promulgate the notion that moving the parking lots ever farther from the Tech Area is part of some sinister Soviet plot to demoralize --or even debilitate--the employees of a vital cog in the nation's defense machine. Au contraire, mes amis. Nothing could be further from the truth. Diligent sleuthing has disclosed that Sandia management, tuned always to the needs of employees before the employees know they need them, deliberately set out to repair the ravages to the employee psyche caused by the passing of corporation Christmas parties, summer picnics, general assemblies, and missile christenings. Our employees, they reasoned, are not just employees--they're psycho-socio-biological entities (PSBEs for short) who cannot function fully without the stimulus of social contact with peers and colleagues in the workplace. General agreement having been reached privately, management caused the construction of an aggravation of buildings on the Tech Area's periphery (where we used to park) and a corresponding slough of parking lots in the outliers, or boondocks. Even now the fruits of those efforts are being realized as we realize that we now must arrive at Sandia by 7 a.m. in order to avoid three-mile hikes. And once we're in a parking lot and have no longer any reason to keep tuned to Brian Ward and his Traffic Snarl, we generally head for the workplace and do just what management wants us to do--engage in social discourse with those fine folks who work with us. Who needs Christmas parties! And now you know . . . the rest of the story.

* * *

When Future Anthropologists Unearth Sandia They'll undoubtedly be frustrated by a traffic group that has nothing to do with rush hour, and by safes stored in vaults inside locked buildings within secured areas surrounded by a military reservation. But most of all by Telecon. Some Bright Young Anthropologist will earn a PhD for proving that we regarded Telecon as a kind of god, praying to it by phone for relief from our earthly discomforts. Certainly that BYA will deduce quickly that Telecon comes from the militarese for "telephone conversation," but imagine his/her/its consternation upon realizing that in 1984 we actually instituted a system for mail-in telecons! ●BH

* * *

Any event, once it has occurred, can be made to appear inevitable by a competent historian. --Lee Simonson

Sympathy

To Stephen Denman (7611) on the death of his mother in Houston, Dec. 9.

To Bob Pedersen (7243) on the recent death of his mother in Chicago.

To Karen Archibeque (7261) and Marlene Leyba (6422/6454) on the recent death of their grandfather.

To Kenneth Peters (7471) on the death of his brother in Albuquerque.

To Claudia Jeffery (3618) on the recent death of her father-in-law in Albuquerque.

Supervisory Appointment



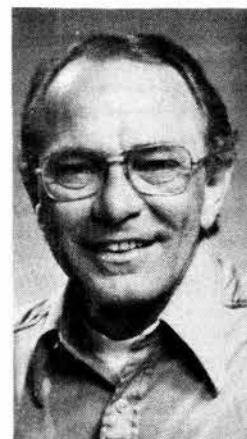
DONA CRAWFORD to supervisor of Operating Systems Division 8235, effective Jan. 2.

Dona joined Sandia Livermore in 1976 as a technical staff member, first doing numerical analysis and applications programs in the Computing Department. As a systems analyst and manager for the new VAX computer system, she taught VAX user courses and acted as consultant on all the computing center systems. Her most recent assignment was project manager of the Cray Time Sharing System.

Dona's education includes a BS in math from the University of Redlands, an MA in German from Middlebury College's campus at the University of Mainz in West Germany, and an MS in operations research from Stanford University through Sandia's One Year on Campus (OYOC) program.

She and Bob Dibble (8351) have two young children, Julia and Joshua. They have lived in Livermore since 1976 and enjoy family outings, including bicycling, camping, and skiing. Dona is active in Women in Science and Engineering and during her spare moments likes to play classical piano.

Death



Dave Kirk, a technical staff associate in Facilities Engineering Division 8255, died Dec. 31 after a long illness. He was 54.

He had worked at Sandia Livermore for 27 years. Survivors include his wife, a son and daughter, and a grandchild.

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BRUCE HAWKINSON, Editor
DON GRAHAM, Assistant Editor
NORMA TAYLOR, Writer
LOUIS ERNE, Photographer
GERSE MARTINEZ, Assistant Photographer
BARRY SCHRADER, Livermore Reporter

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THESE TWO-METER ham transceivers are now on loan from Sandia to the San Joaquin County Emergency Services. Under a mutual aid agreement between the two organizations through RACES (Radio Amateur Civil Emergency Services), the units will be used in emergencies by ham radio operators in that county. Shown with the walkie-talkies before delivery are Ferd Thome (8261) and Cliff Skoog, supervisor of Technical Security Division 8266.

Less Noise, More Privacy In New Drafting Area

There's a new look throughout the second floor, west wing, of Bldg. 912 where drafting is located.

Following the "seismic upgrade" of that portion of the building, three drafting divisions — 8271 headed by Bob Graham, 8272 with Dick Cook as supervisor, and 8274 under Ed English — have moved into the expanded area.

Included in the upgrade are individual cubicles surrounded by five-and-a-half-foot sound-deadening partitions, modular-designed furniture, and carpeting. The combination of these changes reduces distractions and offers semi-privacy for the 53 drafting stations.

The drafting board and CADS (Computer-Aided Design System) stations were designed so as to be interchangeable. Later this year, 12 additional stations will be converted to include CADS equipment.

Take Note

Jim Smith (8024) was recently elected to the board of directors of the Association for Continuing Education (ACE). This consortium of 25 national firms and colleges with facilities in the Bay Area offers employees degree-oriented and continuing education programs from such schools as Stanford, UC Berkeley, M.I.T., Purdue, and the University of Michigan. ACE also operates a four-county, four-channel video/audio interactive network that delivers live and videotaped courses to subscriber companies. Others represented on the board include Standard Oil, Hewlett-Packard, IBM, Xerox, and LLNL.

Fun & Games

A December doubles Fun Tennis Tournament filled the full 16-team roster. First place overall was awarded to Bruce Koopman (8274) and George Hirota (8271). Second place went to Ernie Alford (8161) and Sally Branham (non-Sandian). Subgroup winners included these winners plus Mike Baskes (8341) and Shelia Daigle (8234), and Vic Ham (8361) and Baskes again. The next tourney among Sandians is planned for this spring.

Sympathy

To Mike Pendley (8236) on the death of his father in Louisiana, Dec. 29.

To Carl Pretzel (8453) on the death of his father in Chicago, Dec. 15.

Congratulations

Patti and Tabo Hisaoka (8274), a daughter, Lynnsey Akemi, Dec. 15.

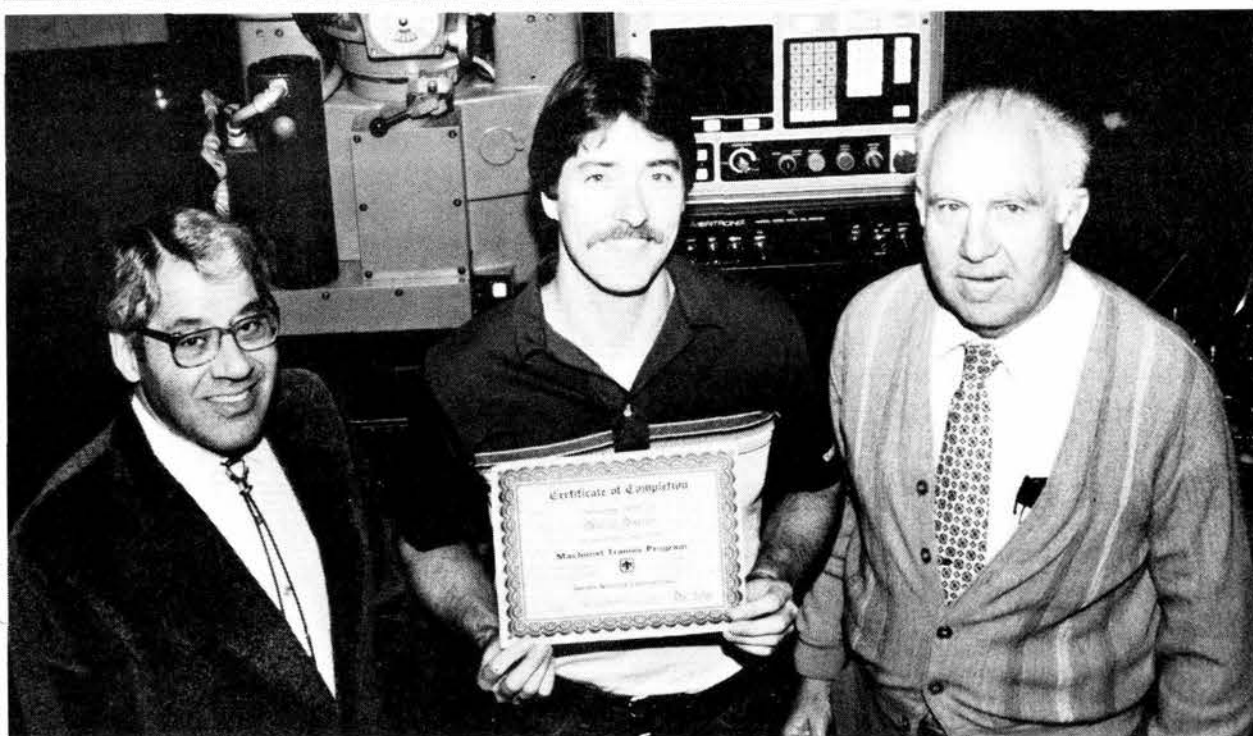


MORE SPACE, more privacy, fewer distractions, less noise — the drafting organizations have new quarters.



SANDIA LIVERMORE NEWS

VOL. 37 NO. 1 SANDIA NATIONAL LABORATORIES JANUARY 18, 1985



FIRST GRADUATE of SNLL's Machinist Training Program is Paul Peaslee (8184), center. New employees are hired as machinist trainees after they have earned an AA degree in machine tool technology; then they go through 36 months of apprenticeship in six phases before receiving the Certificate of Completion being displayed by Paul. He's standing with 8180 Department Manager Roger Baroody (left) and 8184 Division Supervisor Val Black in front of a numerically controlled milling machine that is one of several pieces of equipment he operates. Paul's job classification after completing the program is now Grade 231 machinist.



LATEST LIVERMORE retirees are from left, Joe Genoni (8450), Chuck Thomas (8131), Frank Murar (8472), Carl Lundbom (8272), Dick Wilhite (8254) and Betty Barnhouse (8273).

New Lock Device Gets Patent

ware for all access and removal events. Sampling and transfer of materials were controlled by the operational sequences initiated by an operator and supervisor at authorized work stations. All operations were monitored and any irregular activity or access would get immediate attention. During system tests, standard plant operations actually improved with the system and, following these system tests, an actual working system was installed at the Barnwell Nuclear Fuels Plant in South Carolina."

The rotatable stem and lock fits over existing valves. It can also be installed in new systems. The rotatable valve stem can be operated only when "unlocked." Inside a cylindrical housing and around the valve stem is a solenoid that, when activated by the proper digital code, opens a multi-pin locking arrangement between stem and housing. This action permits movement of the stem and locking rods that insert into receptacles in the housing. When these locking rods are free to move, the valve can be manually operated. Another coded signal releases the solenoid and a spring action pushes the armature to engage the locking pins. In this position, the valve cannot be operated. Valve response information displayed at the computer terminal includes open or closed status and tamper indications.

Although designed for a specific application, the locking device could find applications in the chemical and petrochemical industries or in any situation where limited and controlled access to a liquid or gas is desirable.

George Libman, DOE patent attorney, and Joe Szymansky, supervisor of Invention Reports Division 4051, coordinated the patent application.

Cultural Awareness

Fourth New Mexico Culture Is Focus of Colloquium

New Mexico prides itself on being the tri-cultural state. But is it? Maybe quadricultural is more accurate.

That's the premise of a Cultural Awareness Colloquium, another in a series presented by the EEO/Affirmative Action Department 3510. The speaker is Euola Cox, assistant professor of education and humanities at Eastern NM University.

"Her name is not new to those Sandians who attended Nancy Benson's colloquium presentation on women last spring," says Margaret Harvey(3511), colloquium coordinator. "In discussing the women who have played major roles in the state, Nancy mentioned Ms. Cox for her achievements in



BILL GAMBERALE (3664-I), ED LANE (2122), and FRANK HEWLETT (2115)

Supervisory Appointments

BILL GAMBERALE to supervisor of Building and Facilities Layout Design Section 3664-1, effective Nov. 16.

Bill joined the Labs in September 1951 as a drafting trainee. His career at Sandia has included assignments in personnel, expediting and, since 1959, plant engineering where he has worked with the structural design and layout design groups.

Bill served in the U.S. Army Medical Corps in Japan from 1952-54. He enjoys sports — swimming, soccer, football, and basketball — and was one of the players on the first touch football team organized at Sandia in 1951. Bill and his wife Gloria have two children. They live in NE Albuquerque.

* * *

ED LANE to supervisor of Hybrid Microelectronics and Packaging Technology Division 2122, effective Jan. 1.

Since joining Sandia in June 1956 as an electronics technician, Ed has worked on

the development of neutron generators and timers and on the very first designs for electronic coded switches and electronic protective systems; he has been project leader for programmers and timers on numerous weapons programs.

Ed graduated from Capitol Radio Institute in Washington, D.C., as an electronics technician and received his BS in EE from UNM. He is a member of IEEE. He enjoys fishing, reading, personal computing, and Lobo basketball. Ed and his wife Ethel live in NE Albuquerque.

* * *

FRANK HEWLETT to supervisor of Microprocessors and Memories Division 2115, effective Nov. 23.

Frank joined the Labs in March 1983 as a member of the technical staff in the group he now supervises. Before coming to Sandia he worked in bi-polar technology development for Bell Labs from 1971-76 and for Texas Instruments from '76-83.

Frank received his BS, MS, and PhD — all in EE — from the University of Florida. He is a member of IEEE. He enjoys swimming, bicycling, and handball. Frank lives in the NE heights.

Retiree Deaths

(Oct.-Dec. 1984)

Vernon Baker (71)	Oct. 12
Mary Sparger (69)	Nov. 7
Harry MacNeill (80)	Nov. 24
Oliver Ash (88)	Nov. 27
Henry Roeder (69)	Nov. 27
Ronald Helm (68)	Dec. 1
Luis Martinez (68)	Dec. 8
Edward Connelly (68)	Dec. 8
Margaret Houston (71)	Dec. 24
John Church (71)	Dec. 28
Bernice Umland (73)	Dec. 28

educating Black children.

"Most of us perceive New Mexico as a tricultural state—explored, populated, and developed by the Spanish, the Native American, and the Anglo," Margaret continues. "Ms. Cox will show the error of assuming that Blacks played no role in the settlement, development, and growth of our state. She'll use lecture and slides to substantiate the presence and contribution of Black American pioneers, both men and women, in New Mexico. Her stories date from the 1600s to the present."

The colloquium is on Jan. 24 at 10:30 a.m. in Bldg. 815 (outside the Tech Area). All employees are invited.



HEAR YE, HEAR YE, SCIENCE FAIR JUDGES, past, present, and future:

It's that time of year again when Sandians are asked to serve as science fair judges. There have been some recent changes:

- Time for these assignments may now be charged to A269.
- Optional workshops will be offered for those who may be interested but haven't judged before or for those who want to improve their skills.
- A new VIA category has been established specifically for science fair participants.

If you wish to have your name added to this new science fair category in order to identify yourself as a prospective judge, eligible to charge A269, please call Karen Shane (4-3268).

Meanwhile, here are two science fairs in need of judges:

- Cleveland Middle School, Thursday, Feb. 7, 7-10 p.m.
- Chelwood Elementary Science Fair, Monday, Feb. 11, 8-9 p.m.

If you are interested in helping at either of these, give Karen a call.

Medical Corner

We're Off And Running

It's that time of year again — time to take stock, time to set up goals for the new year. What better place to start than with your health and a decision to do something good for yourself? So, if you haven't already done so, consider the goal of quitting smoking.

Medical is offering its next Quit Smoking Class Jan. 28 through Feb. 20, Mondays and Wednesdays, from 12-1 p.m. in T-13, Rm. 9.

We invite people either interested in Nicorette chewing gum or already using it as well as those who simply wish to derive benefit from the Quit Smoking program. Please contact Arlene Price at 6-0021 to register for the class. Spouses are welcome.

Habits Can Be Broken

"For a Change: Breaking Old Habits and Making New Ones," a 25-minute film, will be shown Monday, Jan. 28 in Bldg. 815 (outside the Tech Area) at 12 noon. The film outlines a method for making permanent behavior changes. This method works for losing weight, quitting smoking, learning to exercise regularly, or changing any aspect of your behavior to improve your health.

Continued from Page One

SLS Laser Demonstrated

with a new range of electronic and optical characteristics.

The new SLS laser, made from alternating layers of indium gallium arsenide and gallium arsenide, is less than one-eightieth of a mil (300 nanometers) long. It produces an invisible beam of low-intensity infra-red light.

"This is the first continuous wave SLS laser ever demonstrated," says Tom. "It throws open the field to make solid-state lasers that operate at virtually any desired wavelength."

"We can say that, macroscopically, an SLS behaves like 'semiconductor X,'" Tom continues. "First you decide what properties you want your semiconductor to have, then you design and grow an SLS to fit these requirements. For instance, if you wanted to make a yellow or green laser, you would want to go into a gallium arsenide-gallium phosphide system."

Solid-state laser diodes are made from chips of single-crystal semiconductor material, such as aluminum gallium arsenide. When an electric current is applied to the material, it excites atoms contained within the crystals, "pumping" them to higher energy states. This extra energy is released as units of light, (photons), which are reflected back and forth from the mirror-like *inner* surfaces of the diode. A certain percentage of the photons escape from the material in the form of a laser beam.

Tom notes that the wavelength at which the new Sandia laser operates is not optimum for use with optical fiber communications, the field where semiconductor lasers are most used. However, he and other members of the research team are confident that SLS lasers operating at other wavelengths are feasible, and will eventually be produced by laboratories that, unlike Sandia, specialize in communications technology.

Meanwhile, research efforts in the science of the strained-layer superlattice, and development of other SLS devices, are continuing at the Labs. Potential applications include new kinds of light-emitting diodes, photodetectors, and microwave transistors.

Credit Union Annual Meeting Set January 24

Annual meeting of the Sandia Laboratory Federal Credit Union is at 5 p.m. on Thursday, Jan. 24, at the Coronado Club. A review of 1984 activities and election of three board members are planned. Candidates proposed by the nominating committee are Paul Brewer (8260), Bob Luna (6321), and Ellen Cronin (6630). Each member attending will receive a small gift, and refreshments will be served following the meeting.

SLSs: A Sandia Development

Sandians have taken a pioneering role in developing strained-layer superlattices, a versatile new class of materials for use in semiconductor device technology. (See LAB NEWS, June 12, 1983.)

SLS semiconductors consist of multiple layers of lattice-mismatched crystalline materials that have a crystalline quality comparable to pure bulk material. As suggested by the accompanying story, the development of tailored SLS semiconductors is allowing the design of electronic devices with better performance, and wider ranges of application, than are available with existing technology.

SLSs are composed of many alternating layers of different types of carefully grown, ultra-thin (less than 300 angstroms; an angstrom is 1/10 nanometer or billionth of a meter) crystalline materials. These layers are mismatched — under normal circumstances the distance between the atoms on one layer would be different from the corresponding "atomic spacing" of the next layer. However, SLS layers are so thin — it would take 5000 layers to equal the thickness of a sheet of writing paper — that their atoms align easily by elastic strain during growth, without causing the imperfections between adjacent layers that otherwise would degrade device performance.

mance.

Such properties should permit the development of new or improved devices, including some that now cannot be produced with common "chip" materials such as silicon and gallium arsenide.

The new compounds come from elements in Groups III and V of the periodic table of the elements. By combining compounds with desired properties, it is possible to "tailor-make" SLS materials with a new range of electronic and optical characteristics.

Sandia researchers believe many new devices will ultimately be developed using SLSs, evolving first along lines that currently are not well served by conventional materials such as silicon. Those researchers include Gordon Osbourn (1132), theory; Robert Biefeld (1154), first to grow SLS material; Roger Chaffin (1140), devices; Ralph Dawson (1141), crystal growth; Tim Drummond (1154), crystal growth; Ian Fritz (1132), electronic measurements; Paul Gourley (1132), optical measurements; David Myers (1141), ion implantation; Tom Picraux (1111) structural studies; Jim Schirber (1150), electronic measurements; and Tom Zipperian (1141), device studies. Several other scientists in the Solid State Sciences 1100 directorate are also contributing to the SLS work.

Rotating Parachute Proving Superior In Testing Program

In wind tunnel and free flight tests a new rotating parachute design by Bill Pepper of Parachute Systems Division 1632 is proving superior — at least twice the drag efficiency of conventional or ribbon parachutes at supersonic speeds.

Called a Rotating Flexible Drag Mill, the new parachute is designed for use on reentry vehicles carrying scientific payloads and instruments meant for recovery. In a recent test on the rocket sled track in Area III, a six-foot-diameter model of the parachute took four seconds to brake a 130-lb. payload traveling at a velocity of just under Mach I (940 feet per second) to a 68-ft.-per-second impact. Neither payload nor parachute was damaged.

The new parachute takes advantage of a spinning effect (autorotation) that develops after the parachute is deployed. The basic design, a two-foot-diameter parachute, has 12 triangular sections (gores) and 12 two-foot-long suspension lines. Each gore contains a flexible fabric panel covering about two-thirds of its width, with an air slot extending along one edge of the panel to intersect the outer edge of the canopy. A swivel unit secured to the lower ends of the suspension lines and attached to the payload enables free and continuous parachute rotation after deployment.

Upon deployment (and after inflation) each panel balloons into an airfoil shape as the air hits its underside. Each panel thus becomes a blade element much like those in a windmill. The panel edge next to the air slot bulges so that the panel assumes an angle of attack relative to the oncoming airstream, causing the panels to rotate the parachute in a counterclockwise direction.

Rotation speed depends on deployment velocity — the higher the velocity, the faster the rotation, and the greater the drag. The two-foot-diameter model of the parachute achieved 150 revolutions per second at a deployment velocity of Mach 2 in wind tunnel testing.

As the parachute rotates, centrifugal force flattens the canopy, creating the increased drag. The rotational speed also provides a high degree of gyroscopic stability, with oscillations of less than three degrees.

Other features of the parachute include rapid inflation (less than a half-second at 600 feet per second velocity), and successful operation at very short distances behind blunt shapes such as a reentry nose cone.

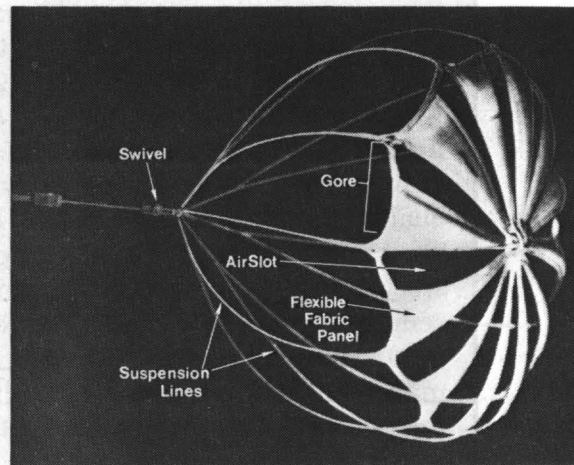
The new parachute is relatively lightweight, requires a minimum amount of material, and occupies a small volume when packed. "The two-foot model we've tested is made entirely of Kevlar and weighs less than a half-pound," Bill says. "We can pack it in a space no larger than a 12-ounce frozen orange juice can. It's easy to lay out and construct, and therefore inexpensive to manufacture."

The parachute design is currently in research and development stages. A six-foot-diameter model is ready for wind tunnel testing, and a 20-foot-diameter model may eventually be tested.

A patent for the parachute has been ap-



BILL PEPPER (1632) displays the basic two-foot-diameter model of his new rotating parachute design that has seen wind tunnel testing at Mach 2 and free flight tests from a rocket sled in Area III. Photo below was taken by strobe light during subsonic wind tunnel testing. The new parachute provides twice the drag efficiency of conventional designs.



plied for. Bill holds one other patent awarded in 1974 for a "self-destructing" parachute. The parachute was designed for operations behind enemy lines. Coated with a pyrotechnic material, the parachute would disintegrate without a trace when an igniter was triggered.

Fun & Games

Squash — Dave McTigue (1511) issues a call for all squash players — first time players, rusty players, active players — to participate in a tournament scheduled Jan. 26-27 at the Tennis Club of Albuquerque. Loaner rackets will be available. Entry deadline is Monday, Jan. 21. For more details, call Dave at 256-1752.

Patent Awarded

Sol-Gel Glass Makes Superior Coating

One of the traditional ways to protect ceramics, metals, and glasses from corrosion and abrasion is to coat them with a thin glass film. A new and better way of applying such coatings has been invented by Jeff Brinker of Inorganic Materials Chemistry Division 1846 and Scott Reed of Glass Formulation and Fabrication Section 7471-1.

The primary advantage of the new method is that it results in a tough, dense, flexible glass film that provides an adherent, protective, and electrically insulative coating. And it's a one-step, low-temperature process.

Basically, the method involves dispersing powdered glass (or glass in any other phase characterized by particulates) in a chemical solution of inorganic polymers called sol-gel. (Sol-gel refers to a gelatinous glasslike network formed in solution by chemical polymerization; see LAB NEWS, April 29, 1983). The polymers crosslink to form a plastic-like material at room temperature and a hard brittle glass at elevated temperatures. The drying step bonds the powdered glass together and, through a chemical reaction, ensures that the film adheres well to a surface.

The process produces microscopically thin films (from 0.1 micron to 100 microns; a micron is about 4/10,000ths of an inch) in a one-step operation at relatively low temperatures, heats harmless to most materials that need such coatings. The films can withstand hostile environments such as high temperatures and exposure to corrosives or abrasives. Furthermore, since no pores remain trapped in the films, they can serve as electrical insulators in harsh environments.

"The sol-gel solution is the real key to our new process," Jeff says. "During the coating operation, it completely wets both the suspended glass particles and the

surface to be coated, or substrate. As the solvent evaporates from the coating solution, the inorganic polymers are increasingly concentrated between the glass particles and at the particle-substrate boundary. This means that the particles are chemically bonded — 'glued' in a sense — to each other and to the substrate. The sol-gel coating also protects the substrate during later heating steps."

In applying the sol-gel solution by the dipping method, the thickness of the sol-gel/glass powder film is controlled by the concentration of the glass particles, variations of the sol-gel solution, and the speed and the angle of the dipping process. The solution can also be fixed to a substrate by spraying or spinning.

After application by dipping, spraying, or spinning, conventional heat treatments convert the microporous sol-gel to a dense, glassy film while melting or sintering (heating without melting) the glass particles.

"In the sol-gel process, the binder that cements the glass powder to the substrate — and to itself — is converted directly to a glass," explains Scott. "The binders used for many conventional processes must be burned out of the glass as a final processing step. This can leave many pores that ultimately weaken the coating."

The new Sandia process is also ideal for coating surfaces that cannot tolerate excessive heat — for instance, nickel and copper — because the sol-gel can be used in combination with low-melting point glass powders. And research indicates that the new process can be used to reliably form coatings of uniform thicknesses over sharp corners.

The process has been awarded a patent issued to the DOE in the names of its inventors.

What's Wrong with the Old Methods?

Each of the traditional methods for applying glass films to metal, glass, and ceramic surfaces has disadvantages. Glazing or enameling processes, for example, are adequate for applying films that measure more than about 100 microns; however, due to problems of adhesion, it is virtually impossible to obtain thinner, continuous films using these processes. High processing temperatures are also often required for glazing and enameling.

Chemical vapor deposition (CVD) can produce thin coatings, but it's expensive. And, because it's a relatively slow process, CVD is not

particularly well suited to the continuous production of films on large surfaces. Also, the film is often porous and usually must be reheated to ensure complete densification.

Immersing the items to be coated in molten glasses (or drawing them through molten glass) is a high-temperature operation and results in relatively thick films. Neither immersion nor glazing, then, can produce coatings thin and tough enough to be flexible.

The sol-gel process invented by Sandians Jeff Brinker and Scott Reed sidesteps most of these disadvantages.

Sol-Gel Films: Some Perspective

The recently patented method for applying glass coatings by means of the sol-gel process grew out of a Los Alamos National Lab problem. Scientists there were having some difficulty in finding a satisfactory way to apply dielectric (nonconductive) films to the copper magnets used in their LAMPF (Los Alamos Meson Physics Facility). They needed microscopically thin, radiation-hardened dielectric films that would adhere to sharp edges and corners. The sol-gel process promises to meet these conditions.

It's too early to tell whether the new method will be adopted by the world outside the weapons labs. "Except for the optical coatings industry, most work in this area is done by small labs within larger organizations," says Jeff Brinker (1846), one of the inventors of the new method. "But we've exchanged information with CERN in Switzerland, IBM, RayChem, Allied Chemical, and duPont, to drop some major names."

"We've also talked with some solar firms who may be interested in the process as a means to improve the performance of heliostats and solar collectors," adds Rod Quinn, Jeff's supervisor. "For example, the process may allow a new kind of flexible mirror—apply silver to a metal substrate, then coat the silver to protect it, bend the metal into the proper contour, and you'd have a solar concentrator."

"The whole field of chemical processing for glasses and ceramics is taking off," Rod notes. "We can't know yet whether the sol-gel process will help to build the industry, but it's typical of the kind of advance the field is looking for."

"And I believe that the process will also have applications in the microelectronics field outside Sandia; the idea of pinhole-free dielectric barriers between stacks of semiconductor wafers — interlayer dielectrics, it's called — is receiving a great deal of attention. Sol-gel coatings could work well for such an application."

Sol-gel is not Sandia's only achievement in the field. "We're a leader in building glasses and ceramics by chemical — as opposed to the traditional mechanical — means," Rod continues. "We're at the forefront when it comes to beginning with inorganic polymers and controlling the necessary bonding reactions on the molecular scale. It's an entirely different concept from the typical method."

That same pride is apparent as Dick Schwoebel, director of Materials and Process Sciences 1800, discusses the sol-gel process. "It's a very nice piece of work," he notes. "It will likely have many other applications that we've not yet considered—most of them, I suspect, outside the purview of the Labs."

"But I believe the new process is of genuine technical significance."



NEW AND BETTER way to apply a glass coating to a substrate has been invented by Jeff Brinker (1846) and Scott Reed (7471). The recently patented process involves a sol-gel solution like that in the beaker. Resulting coatings are flexible, adherent, protective, and electrically insulative.

Events Calendar

Jan. 18-19, 24-26 — The Cabaret Co. and the ALT Second Story Arts Center present "Come Fly With Me," a cabaret review; 8:15 p.m., Albuquerque Little Theatre.

Jan. 20 — Gaylord Carter, theater organ, First United Methodist Church, 4th & Lead SW, 243-5646.

Jan. 23 — Annual San Ildefonso Feast Day; Comanche, Buffalo, and Deer Dances, call Pueblo: 1-455-2273, 1-455-2274.

Jan. 25 — Various dances at Picuris Pueblo, call Pueblo: 1-587-2043, 1-587-2519.

Jan. 25-Feb. 10 — "Footlight Frenzy," directed by Bill Daily; Tues.-Fri. at 8 p.m., Sat. at 6 & 9 p.m., Sun. at 2 p.m.; Albuquerque Little Theatre, 224 San Pasquale SW, 242-4750.

Jan. 26 — Albuquerque Jaycees Track and Field Invitational, high school events at 5 p.m., open events at 7 p.m., Tingley Coliseum, 262-2211.

Jan. 26, 29, Feb. 2 — "Julius Caesar," chamber opera sung in English, Albuquerque Opera Theatre, 8:15 p.m., KiMo, 243-8492, 243-0591.

Jan. 27 — Dennis Schmidt, organist; the complete organ works of Bach, 4 p.m., St. John's Episcopal Cathedral, 247-1581.

Jan. 27 — The NMSO Sinfonietta, "Impressionists Idylls," works by French and American composers, 3 p.m., First United Methodist Church, 842-8565.

Jan. 28 — "Kiwi Country," a film that depicts the backlands of New Zealand, its wildlife, and forests; 7:30 p.m., Popejoy, 881-9387.

Feb. 1 — KiMo Guitar Series: The Romeros, classical and Spanish guitar, 8 p.m., KiMo.

Feb. 1 — KiMo Guitar Series: The Romeros, classical and Spanish guitar, 8 p.m., KiMo.

Congratulations

Barry (6313) and Marcia Schwartz, a daughter, Rebecca Michele, Dec. 14.

Steven Chaba (1254) and Laura David, married in Rochester, N.Y., Dec. 27.

ACM Meets Feb. 1 At Technology Transfer Center

Winter meeting of the Rio Grande Chapter of the Association for Computing Machinery will be held Friday, Feb. 1, in the Technology Transfer Center starting with registration at 8:30 a.m.

Two Sandians will present talks at the meeting as part of a program that includes discussions of user interface design, software testing, artificial intelligence, graphics, security, and numerical software. Dick Hansen (2646) will discuss numerical software and Richard Kuehn (2133), computer security.

A dinner is scheduled that evening at the Regent Hotel. Speaker will be David King, secretary of the New Mexico Department of General Services, who will discuss "The Rio Grande Research Corridor — Past, Present, Future."

Interested Sandians are invited to attend. For a copy of the program and additional information, call Lee Walton (2112), secretary of ACM's Rio Grande Chapter, on 4-2345.

Retiring



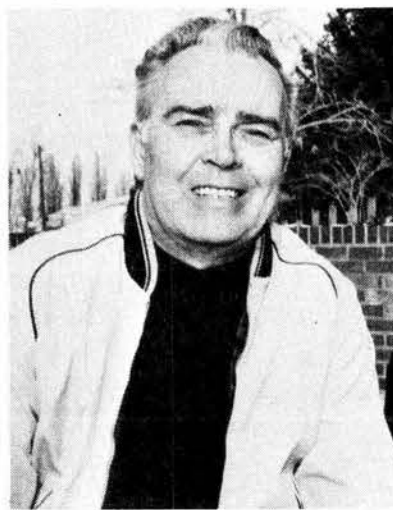
Eunice Simpson (100)



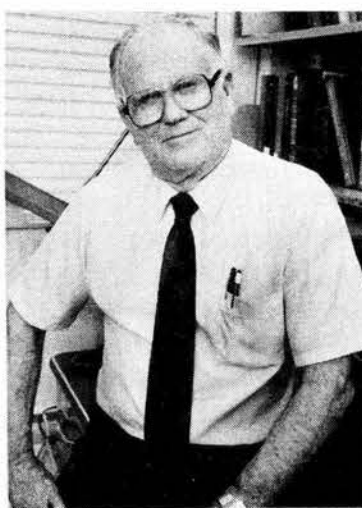
George Chapman (3661)



Jesse Bozone (5541)



Harry Cherb (3615), Jack LaBrier (3615)



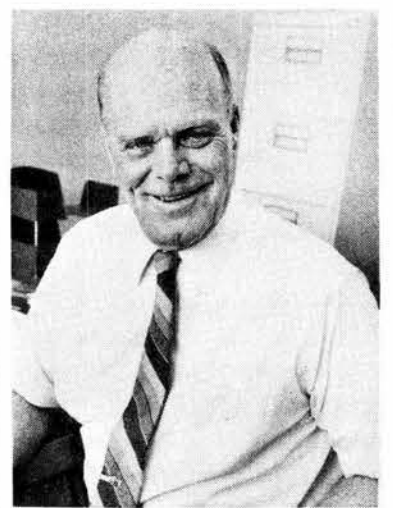
Willis Whitfield (6453)



Charlie Clendenin (2601)



Bill Huff (7241)



Allen Thornton (2533)



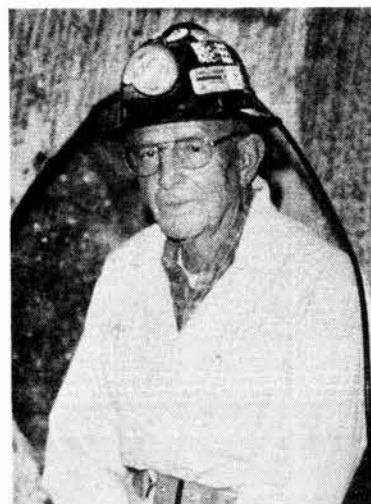
Jim Hall (3426)



Tom Strome (7211)



Bob Scalf (7474)



Frank Hensley (6332)



Martin Dieter (3142)



Mac Griffin (2530)

Take Note

The 1985 Science, Philosophy, and Religion (SPAR) Symposium will be held Jan. 24-25 at the KAFB West Officer's Club. This annual symposium brings various speakers together to discuss topics of concern to the defense industry. This year's topic is "The Differing Roles of Scientists and Engineers in Industry, Academia, and Government in the Defense Policy-Making Process." Speakers include Ret. Gen. Lew Allen, VP, California Institute of Technology, Director of Jet Propulsion Laboratory, and former AF Chief of Staff; David Dye, consulting physicist with Boeing Company; The Rev. Alfred McBride, President, U of A; Ward Minge, AF Weapons Laboratory Chief Historian; and Col. Carol Yarnall, Chief, Space Recon Systems Division, AF Operational Test and Evaluation Center, KAFB. Moderator will be Ret. Col. Bob Francis, formerly Commander of AF Weapons Laboratory and USAF Space Technology Center.

Tickets (\$20) are available at the door or by mail from SPAR, Inc., P.O. Box 18067, Albuquerque, 87185. For reservations or information call 836-1100 or 846-3595.

The department of chemical and nuclear engineering of UNM is sponsoring a one-week short course in nuclear criticality safety May 13-17 in Santa Fe at the La Posada de Santa Fe.

The purpose of the short course is to provide an overview of the theory and practice of nuclear criticality safety. The course content is directed toward the person with less than two years experience in the field. However, those who are experienced in a particular aspect of the field may also find the overview to be of value.

Enrollment is limited to 35; applications must be received by April 1. Admission will be on a first-come, first-served basis. Fee for the course is \$500 for members of the ANS Nuclear Criticality Safety Division (NCS) or \$525 for non-members. For application or more information, contact Glenn Whan, Department of Chemical and Nuclear Engineering, UNM, Albuquerque NM 87131, 277-0446 or 277-5431.

The Albuquerque Solarfest is an all-day, free, solar energy and energy conservation information event in the form of seminars, publications, exhibits, displays, demonstrations, and design assistance. This event is presented by the NM Solar Energy Institute-NMSU and Albuquerque T-VI, the NM Energy Research and Development Institute, and the NM Energy and Minerals Department. The Solarfest will be held Feb. 16, 9 a.m. to 4:30 p.m. at the T-VI PREP Bldg., University and Coal.

Two United Way awards were presented to Sandia following the successful completion of the 1984 ECP campaign.

The Zia Award for per capita giving (Sandians gave \$156 per employee) "is presented to employees of Sandia National Laboratories for their most generous support of the people in our community. United Way, 1984."



REBECCA BURGESS-SIEGLE (6224) conducts a science class in solar energy at Van Buren Middle School. She was one of 15 Sandians who recently substituted for Albuquerque classroom science teachers attending an area convention of the National Science Teachers Association. Some 1100 teachers from the western states attended the meeting. Sandia participation in the program was arranged by Nancy Finley of Education and Training Division III 3523.

"The Cumbres Award is presented by United Way of Greater Albuquerque to Sandia National Laboratories for outstanding corporate leadership in the 1984 United Way Campaign."

Application forms for the 1985 NM Arts and Crafts Fair are now available. The Fair is open to NM residents, 18 years of age or older. Works will be accepted on Feb. 14 and 15, juried on Feb. 16, and returned on Feb. 17 at the Flower Building on the NM State Fairgrounds. The 24th Annual NM Arts and Crafts Fair will be June 28-30.

NMACF also announces a new grant program, "Redistributing Funds to the Arts Community." The Fair will consider grants up to \$1000 for projects in the visual arts, crafts, and media arts to be given to individuals or organizations based in New Mexico. Deadline for applications is March 1.

For more information, contact the NMACF office, 2745 San Mateo NE, Suite G, Albuquerque, 87110, 884-9043 (Mondays or Thursdays, 9 to noon).

The APS Parent Center offers the second annual Mini Conference for Parents on Feb. 9 at Albuquerque High School from 8:15 a.m. (registration time) to 1 p.m. Parents preregister to attend one seminar for each of two sessions (10:15 - 11:30 a.m. and 11:45 a.m. - 1 p.m.). The conference, sponsored by Albuquerque Public Schools, is free of charge; child care is not available. Stop by the LAB NEWS office for registration forms and a list of the available seminars.

Spring session of L'Ecole de L'Alliance Francaise D'Albuquerque begins Jan. 28, for 12 weeks, two hours per week. Day or evening classes for all levels are small and include conversational French, French for travelers, business French, phonetics, and French cuisine. Registration deadline is Jan. 26. For more information contact Christiane Vigil, 294-5957.

KAFB's Arts and Crafts Center announces starting dates for the following new classes: Portraiture in Photography, Jan. 29, 6:30 - 8:30 p.m.; Basic Woodworking, Jan. 30, 6 - 8:30 p.m.; Beginning Pottery, Jan. 30, 6 - 8 p.m.; and Photo Silk-

screen Workshop, Feb. 2-3, 2 - 4 p.m. For more information call 844-0222.

The National Atomic Museum has a special exhibition: memorabilia from the early days of the nuclear weapons program (1950-62). Most of the exhibit consists of documents and photos collected by Richard Elliott, who was chief public information officer with the AEC (predecessor to the DOE) in New Mexico from 1950 to 1970. In addition to materials depicting the nuclear testing program (for both weapons and peaceful purposes, i.e., the Plowshare Program), the exhibit covers radioactive power sources for satellites and other space missions. Photos show visits to New Mexico by many of the political and scientific leaders (Kennedy, Johnson, Teller, Seaborg, and others) and prominent news reporters of the period.

Welcome

Albuquerque

Merlin Current, Jr. (7653)
Richard Green (3613)
Paul Elder (2125)
Lawrence Desonier (5268)
Melissa Myerly (7653)
Larry Powell (1512)
Carol Ritter (112)
Ronald Sikorski (7622)
Mike Salazar (7472)
William Tarbell (6422)

California

Randall Romero (2321)
John Stephens, Jr. (1832)

Illinois

Daniel Fisher (2336)
Mark Parzgnat (321)

Iowa

Michael Neilsen (1521)

New Mexico

Ami Goodman (3552)
Michael Hurst (1244)
Thomas Mancini (6226)
Walter Schuster (7485)

Pennsylvania

Barbara Behe (2632)
Gregory Behe (2634)

Texas

David Coons (2114)

West Virginia

Elmer Collins (7222)

MILEPOSTS

LAB NEWS

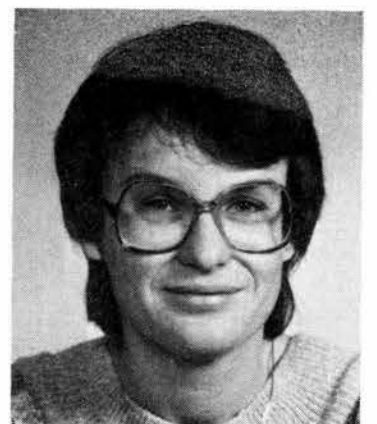
JANUARY 1985



Myron Pilat (7251) 30



Ramona Anderson (8024) 20



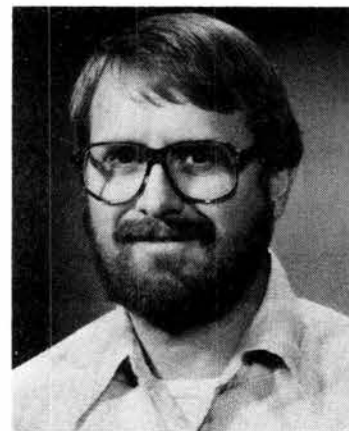
Jill Green (8272) 10



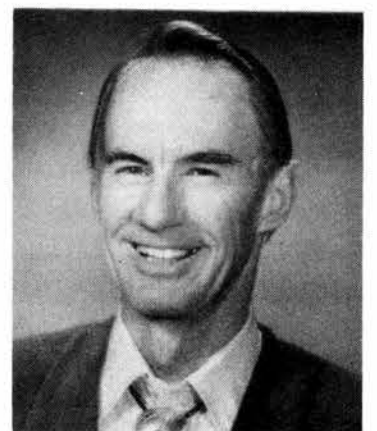
George Edgerly (7471) 25



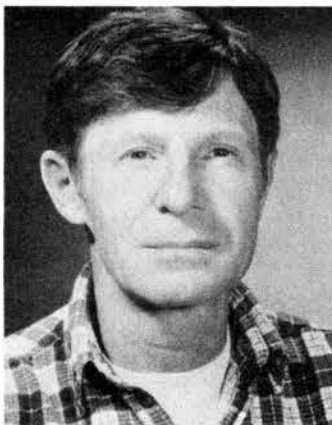
Gil Esquibel (8173) 25



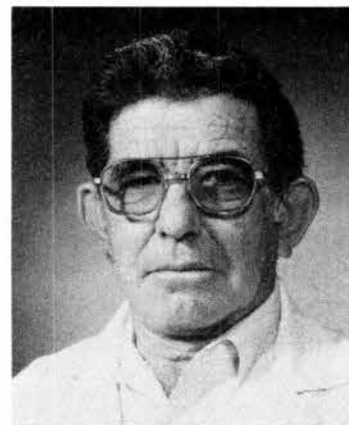
Randy Swier (5143) 15



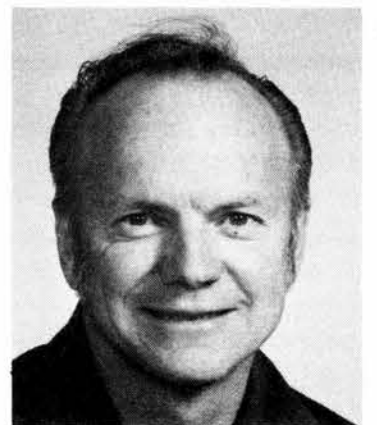
Jim May (5252) 25



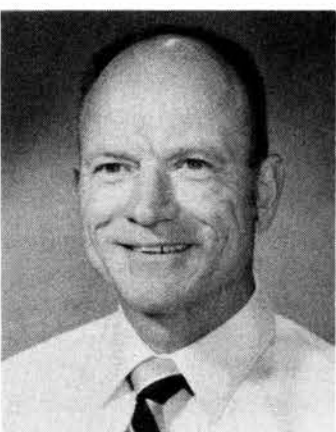
John O'Hare (7521) 15



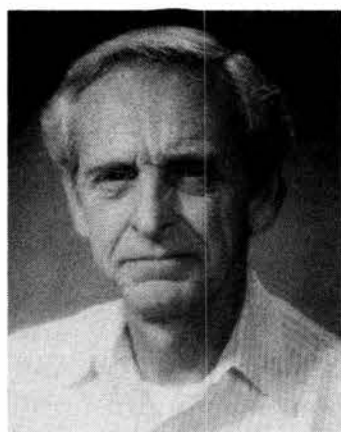
Prospero Toledo (3618) 20



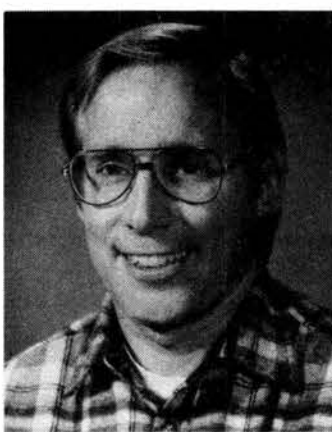
Dan Stoner (8173) 25



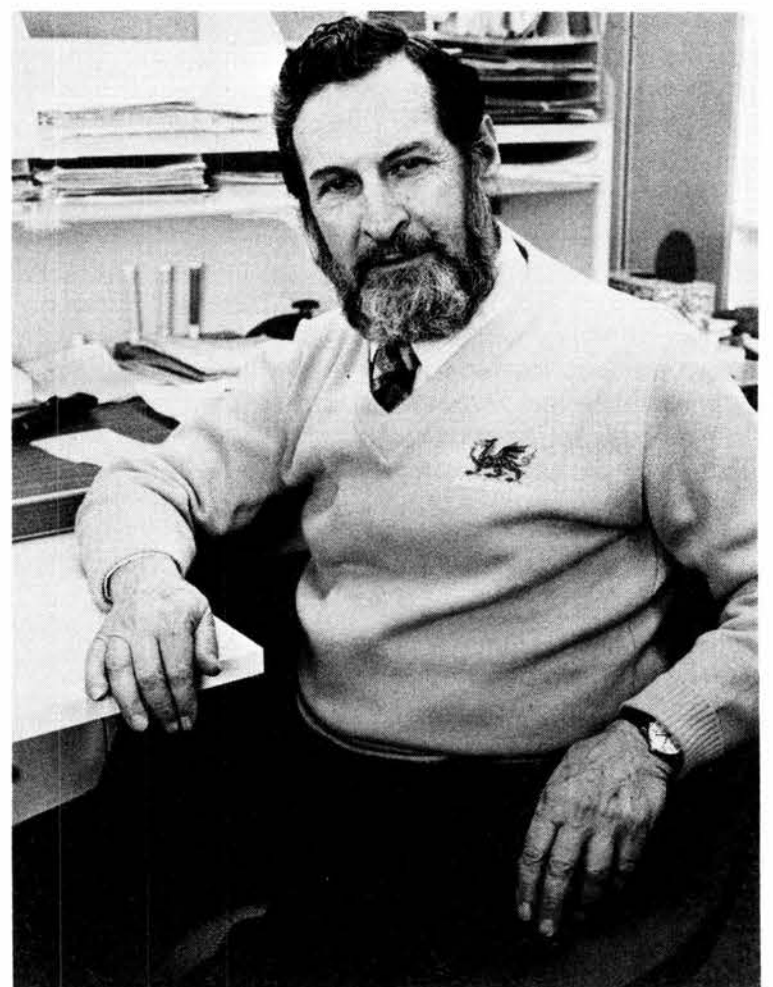
Farrell Perdreauville (5343) 20



Howard Lehman (5264) 25



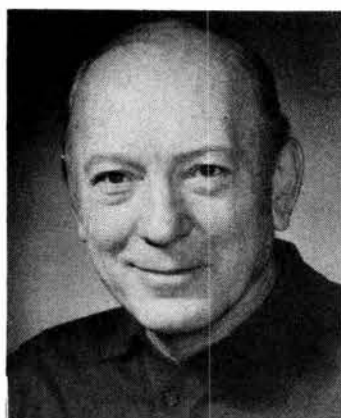
Ron Hartenberger (7474) 10



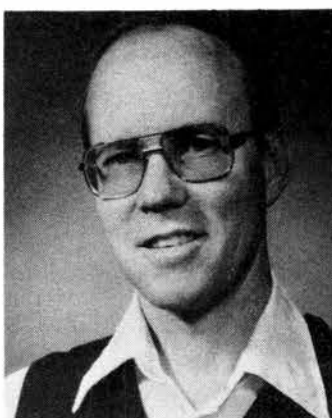
George Cosden (3732) 30



Don Parker (3311) 20



Dwight Allensworth (1131) 25



Archie Farnsworth (1533) 15

Cold Sore Victims Sought for Medical Research

Local family physician Jack Redman needs volunteers to participate in a controlled research study for the treatment of recurrent cold sores.

Recurrent cold sores (herpes labialis) are caused by a virus called herpes simplex. One becomes infected with this virus during childhood and thereafter the virus remains in the sensory nerves located in the skin around the mouth and nose. Most of the time herpes simplex virus is dormant (latent state). However, intermittently it becomes active, travels down the nerve to the outer skin, and causes a blister (cold sore).

For 16 years Dr. Redman has been using an injection of gamma globulin — the portion of the blood containing most antibodies for fighting disease — to treat herpes infections. However, to determine if gamma globulin actually benefits the treatment of these infections, Dr. Redman, in conjunction with Drs. Larry Davis and Leroy Mc-

Laren of the UNM School of Medicine, is conducting a "double-blind" controlled study of 75 volunteer patients. The participant will receive either gamma globulin or a placebo (an inert or nonactive substance) in a random fashion and will be asked to keep a log of all cold sores for six months. The study is designed so that neither the doctors nor the participants will know which drug was received until the end of the study.

Thirteen additional volunteers are needed to complete the study. Volunteers must be over 21 years old, have cold sores at least four times a year, understand the nature of a double-blind study, go to Dr. Redman's office for a single intradermal injection (in the skin of the middle forearm), then return a report form six months later. The injection must be given at the time of an active outbreak.

Six months after the 75th patient gets his or her injection, the code will be broken and

the results tabulated. If the study proves the validity of Dr. Redman's observations about the apparent effectiveness of intradermal gamma globulin, he believes that the impact on virology, immunology, and cancer research will be great.

To volunteer for this study, call Dr. Redman's office, 243-3200.

Brother, Can You Paradigm?



"Whenever intellectuals discuss science these days, the term 'paradigm' is exhibited and tends to endow its speaker with an unnatural self-assurance. 'Paradigm shift,' even more potent than simple 'paradigm,' is spoken with a kind of muted awe. This use of the word paradigm we owe to Thomas S. Kuhn, a historian of science whose 1962 book, *The Structure of Scientific Revolutions* ... proposed that science advances through a chronological succession of paradigms — general descriptions of the natural world that, at given points in history, are seen by scientists as fundamental and self evident. ... Kuhn's visions of Armageddon notwithstanding, we really haven't had a good old-fashioned barn-burning, window-rattling paradigm shift in quite some time. In fact, contemporary science seems to accept most change with equanimity."

Robert Pollie in *Science* 83

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5. For active and retired Sandians and DOE employees.
6. No commercial ads, please.
7. No more than two insertions of same ad.
8. Include name and organization.
9. Housing listed here for sale is available for occupancy without regard to race, creed, color, or national origin.

MISCELLANEOUS

STERLING flatware, service for 10, many extra serving pieces, \$1400. Hills, 884-6988.

FREE — Norwegian Elkhound needs good home with adults only or older children, spayed female, obedience trained, 5 yrs. old, AKC reg. Murray, 821-1537.

WATERBED complete w/frame, heater, bumpers, 3 sets of linen, \$200 or make offer. Gallegos, 881-1363.

1950 & 1960 radio and TV tubes at wholesale; beginner's guitar, \$40; rear wheel bicycle exerciser, \$25. Scranton, 869-6589.

SHRUB, Spanish broom, yellow flowers, 6' tall, \$10, you dig. Shunny, 265-1620.

REFRIGERATOR/freezer, Montgomery Wards side-by-side, 20.9 cu. ft., textured yellow, still under warranty, frost free, \$550. Montano, 292-0137.

TAPE DECK: H16A quality reel to reel, Pioneer RJ-707; dynamic range expander & professional equalizer. Frost, 293-4676.

SLIDER windows w/screens: 3x3 obscured, \$10; 3x5, \$15; cast bathtub, \$25; rims w/tires (Honda Civic), \$5 ea. Reif, 299-2665.

SNOWTIRES, F78-14, both for \$40. Clements, 293-5618.

VIDEO cassette recorder w/4 tapes, Sanyo Beta II & III, 2 yrs. old, \$150. Spears, 266-9782.

PIANO, Yamaha electric, full keyboard, 6 mos. old. Sweenhart, 291-0747.

FIREPLACE: Majestic Mercury Model MFW36, 36" dia., full circle, chain hung, \$225. Wilde, 881-6910.

KENMORE 17.2 cu. ft. refrigerator, \$550; Craftsman 3.5 hp gas lawn-

mower, \$150; both almost new. Meyer, 296-2890.

DESK, student size for child, 17"x31" w/chair, 3 drawers, \$40; AM-FM car radios, 2 ea., best offers. Bennett, 298-1142.

FREE kittens, 6 wks. old, one beige tiger, one pure white. Crafts, 831-5234.

GARAGE DOOR, metal, 16x7, \$50; 1200 egg incubator for all sizes of eggs, \$375. Will trade: need hens & ducks. Lackey, 898-6638.

ODELL aquarium, 75-gal. w/stand & all accessories, \$150. Rogers, 293-5726.

AIRCRAFT T-hangar at Sunport, 30-yr. lease on ground, 40' wide x 33' deep, 12' high door; lt. green nylon carpeting, 10 ft. sq., 3 ea., \$25; Odyssey moped, \$195. Henning, 296-6337.

DAYBED cover, bolsters, matching bolster covers, cream w/yellow piping, \$50. Goldstein, 821-9531.

SLR camera, 35mm Minolta XGM w/Vivitar 28-85mm zoom lens, Minolta XP100 electronic flash, tripod, camera bag, \$295. Lassiter, 299-1492.

BEDROOM set, Bassett, white, twin beds, mattress & springs, \$250; playpen, \$10. Kohut, 884-1405.

FREEZER, chest, Coldspot, 21.75 cu. ft., \$125. Gurule, 294-6541.

LOVESEAT sleeper sofa, \$150; maple coffee table, \$15; swivel rocker, \$75; end table w/glass, \$35; record player, \$15. Mowrer, 292-4238.

ELECTRIC guitar, Hondo Deluxe Series 760 w/3 single coil pick-ups, whammy-bar, strat-body, one volume, two tone controls, green, never used, \$200 OBO. Roberts, 293-9023.

TIRES, 2 ea. N50-15, mounted on American mags, 200-S polished, balanced, \$225 takes all. Stephenson, 292-1161.

PIANO, Kimball spinet, recently tuned, \$850; violin, full size, bow, case, made in Mittenwald, Germany, \$485. Moss, 265-6077 after 5.

TV console, Catalina, color, 21" screen, AM-FM radio & stereo in wood cabinet, TV needs work, \$200. Hesselden, 881-4831 after 5.

B&W port. TV, 14" screen, \$50. Perea, 898-8328.

REPAIR manuals for 1976 Ford van or truck & 1980 Chev. truck, \$12 set; stereo components: 25W amplifier, \$30, AM/FM/MPX tuner, \$30, cassette tape recorder, \$50. Garcia, 293-3937.

USED patio door, single pane glass, screen frame, fits 96" opening,

\$60. Clendenin, 299-2071.

TEAK rollout desk, \$150; Vitamaster exercycle, \$60; 20" Schwinn Stingray girl's bike, \$60. Brown, 298-1303.

DIN. RM. fixture, 4 light black iron, \$10; roof TV antenna, \$10; 4-chair dinette, \$200; ladies ski boots, Dynafit 8, \$45. Pritchard, 293-5297.

AIR compressor, Campbell & Hausfeld 2-cyl. w/4-hp gasoline engine. Hansche, 281-5623.

SANDIA HISTORY PROJECT is looking for a complete or nearly complete set of Sandia phone books and for any scrapbooks, letters, or other documents of historical value. Call Tonimarie Stronach (3160) on 846-9618 or mail items to her c/o Dept. 3420, SNLA, 87185.

REFRIGERATOR, Sears, harvest gold, \$275. Williams, 293-4115.

ROPER gas wall oven, \$125; avocado carpet, 10x10, \$10; blue carpet, 10x11, \$10; multicolor green, 12x12, \$20. Verardo, 883-9778.

UPRIGHT freezer, \$150 OBO. Curtis, 881-2440.

X-C knickers by Landan, man's size 32, brown corduroy, Gore-Tex lined, \$20; wool army pants, 32W, 31L, \$10. Erickson, 298-4416.

KENMORE zig-zag sewing machine case & console, \$100; one maple twin bedstead, box spring & mattress, \$100. Delollis, 299-5384.

TRANSPORTATION

'77 DATSUN B210 hatchback, orig. owner, 64K miles, 5-spd., yellow, approx. 38 mpg, \$2100. Barr, 821-5870.

'81 PONTIAC Grand Prix, diesel, luxury interior, loaded, \$5600. Brane, 299-0148.

'71 FORD Maverick, 6 cyl., 4-dr., AT, one owner, \$750. Eaton, 299-7271.

'79 PONTIAC Firebird, midnight blue, one owner, new tires, stereo, cassette player, many extras in-

cluding sports pkg., \$4500. Montano, 292-0137.

SCHWINN Varsity 10-spd., womens, 26", \$75; Mont. Wards mens 26", \$40; countertop w/sink, \$100 OBO; indoor plant nursery. Hitchcock, 294-4591.

SCHWINN 10-spd., cost \$180, sell for \$100; 13' Carefree awning, \$250. Campbell, 294-6000.

'83 PONTIAC TA, low mileage, \$10,500 OBO, AM/FM radio, AC, 5-spd. Griffin, 294-5702 after 4:30.

'69 FIREBIRD, V8, 4-spd.; new paint, interior, & tires; 78K miles, \$2375 OBO. Yarberry, 821-1002.

'78 DODGE Aspen, mid size str. wgn., book value \$2250, sell for \$2000, AC, PS. Sanchez, 242-2256.

'78 TOYOTA Celica GT coupe, 5-spd., AC, sunroof, \$3500. Carkeet, 266-2389.

'83 FORD Ranger, LB, AC, AM/FM radio, 2.3 liter, 4-spd., alum. shell, \$6200, will consider reasonable offers. Ostmeier, 296-8306.

'79 DATSUN SW 510, \$2100 OBO. Crafts, 831-5234.

'80 TOYOTA Corona LE, AT, AC, AM/FM, silver exterior, burgundy interior, 52K miles, many extras, \$5700. Curlee, 299-6772.

MOTOBECANE Jubilee sport bicycle, 12-spd., 23" frame, \$250; Smith & Wesson 44 magnum, 6" barrel, blue, \$325. Haaker, 293-1077.

MAN'S Columbia 26" 3-spd. bicycle, blue/chrome, new tires/tubes, \$45. Burstein, 821-6688.

'68 CHEVY pickup, V8, standard, w/camper shell, low mileage. Chaves, 892-9765.

'77 VW van, new tires, new paint, new upholstery, \$3000 OBO. Armstrong, 298-4526.

'81 PONTIAC Phoenix 4-dr. hatchback, PS, PB, AC, 4-spd., \$3200. Byars, 294-6676.

'77 CHEVY 4-wd, 4-spd., 350 stock engine, 4" Rough-Country lift, extra lg. tires, roll bar w/lights, new paint. Garcia, 296-1038.

'82 SUZUKI GS750T, 3100 miles, \$1950 OBO. Greene, 299-2091.

'79 280ZX, AC, AM/FM, 64K miles, AT. Smith, 281-2940.

'71 VW Super beetle, radial tires, \$1900. Snow, 345-5957.

'74 FORD Maverick 302 V8, 4-dr., AT, PS, AC, vinyl top. Geck, 299-5095.

'74 CHEV. LWB pickup w/camper shell, 4-spd., V8, 57K miles, \$2500. Hudson, 255-8385.

'80 TOYOTA pickup, 4-wd., AC, AM/FM/tape, 65K miles, \$4700; '83 Alliance, 14K miles, loaded, \$6500. Jones, 255-7924.

'69 DODGE Polara 2-dr. V8, AT, PS, AC, trailer hitch, springs, \$750. Martin, 294-2381.

'74 DODGE cargo van, 3-spd., PS, PB, bronze w/stripes, dark tinted windows, ready for conversion. Benson, 268-9727.

'82 CAMARO Berlinetta, 21K miles, T-tops, AC, AM/FM/cass. Rodriguez, 345-0212.

REAL ESTATE

CONDOMINIUM, spacious 1-bdr., washer/dryer inside unit, clubhouse facilities, pool, security, 7 1/2% assumable loan, negotiable terms, \$41,900. Mathias, 296-0052.

FOURPLEX in NE near Copper & San Pedro, excellent rental history, 2-bdr. apts. w/dishwasher, appliances, disposal & laundry facilities in bldg. Jones, 298-4741 or SooHoo, 294-0268.

TWO small houses, 2-bdr. and 1-bdr., always rented, owner financed, both for \$52,900. Simmons, 255-3297.

FIVE acres in Cibola Trails, 30 mi. SW of Grants, wooded, elec., \$4500 OBO, will consider terms or trade. Pritchard, 293-5297.

WANTED

MOVING space for small misc. tools, chairs, clothing to York or Manheim, Penn. Harris, 255-6577.

TREES to cut down, will take firewood, leave small branches, cottonwood, elm., etc.; no power lines, please. Shunny, 265-1620.

GOLF clubs, left-handed. Eaton, 299-7271.

SKI boots, 7 1/2-8 1/2, ladies. Reif, 299-2665.

PLACE to cut firewood; will cut, deliver & stack firewood from your land in exchange for part of it. Creel, 294-1650.

COMPOUND, metal turning, to fit older Delta wood lathe. Hollenbach, 5439 Charlotte Way, Livermore CA 94550.

OLD card game, "Flinch," bought at Church rummage sale is minus card No. 12. Can anyone supply it? Game no longer available. Matlack, 256-7371.

OUTSTANDING photos of Chaco Canyon ruins, preferably B&W prints, for book on Chaco I'm completing. Frazier, 293-6335.

GOOD HOME for 3-yr-old male cocker spaniel. Free. Lucero, 299-6300.

LOST

LOST Tech Area I: Cross Sandia logo pen, 1/9/85, in white pocket protector. Mills, 299-2130.

Try 'Superbowl' At C - Club

TONIGHT, The Club's dining room offers another of its special two-for-one dinners — this one is filet mignon for two for \$11.95. Reservations are required these days to assure seating in the early evening, but after 7:30 you can usually find a spot. In the meantime, call the office, 265-6791, and make the reservations. It's an easy habit to cultivate. Western Flyer is on the bandstand from 8:30 until 12:30 playing country western music for dancing.

ON SUNDAY, Jan. 20, join the group at the Club and share the Superbowl game excitement with friends. Two big screen sets will be in operation, free munchies and goodies will be spread, and special prices will be in effect.

FRIDAY, Jan. 25, sees the return of the Isleta Poor Boys and their popular brand of country and western music. The dining room features another two-for-one special — prime rib, two for \$11.95.

CORONADO SKI CLUB plans its "Carnival '85" the weekend of Jan. 26-27 with activities centered on the slopes of Sandia Peak ski run. Planned are races and slaloms for beginners through serious competitors, a wine and cheese party, more races including an obstacle course, and a wrapup at the Club on Sunday evening with award presentations, a buffet supper, and dancing to the WDC Band. If you need details, call Sharon Mackel (330), 6-3190.

THE RETIREE SPECIAL INTEREST GROUP is now organized, call themselves the Coronado Thunderbirds, and plan a dinner dance on Saturday, Feb. 23. Don Lesman's big 11-piece orchestra has been booked for the event. All Sandia and DOE retirees are invited. Call the Club office, 265-6791, for reservations.



Gray Named Fellow of American Physical Society

Eoin Gray, who transferred to Sandia's Power Flow Research Division 1261 last December from AT&T Bell Labs, was named a Fellow of the American Physical Society recently. The honor was "for his many contributions to the physics and chemistry of arcing at atmospheric pressure and their applications to industrial systems."

The work, performed at Bell Labs' Columbus, Ohio, location, dealt with the arcing mechanisms that erode telephone switching equipment and lead to loss of precious metals such as gold and palladium. The work included the reactions of ions in arc afterglows and high voltage breakdown. He also worked on lightning protectors and printed wiring technology and reliability. The arcing mechanism studies have applications in electromagnetic pulse protection and in his current work at Sandia, plasma production in diodes and surface flashover on insulators.

A native of Northern Ireland, Eoin earned his PhD in plasma physics from The Queen's University of Belfast in 1967. The same year he was appointed a postdoctoral fellow in the chemistry department of the University of British Columbia, Vancouver, where he studied aspects of the photochemistry of singlet molecular oxygen.

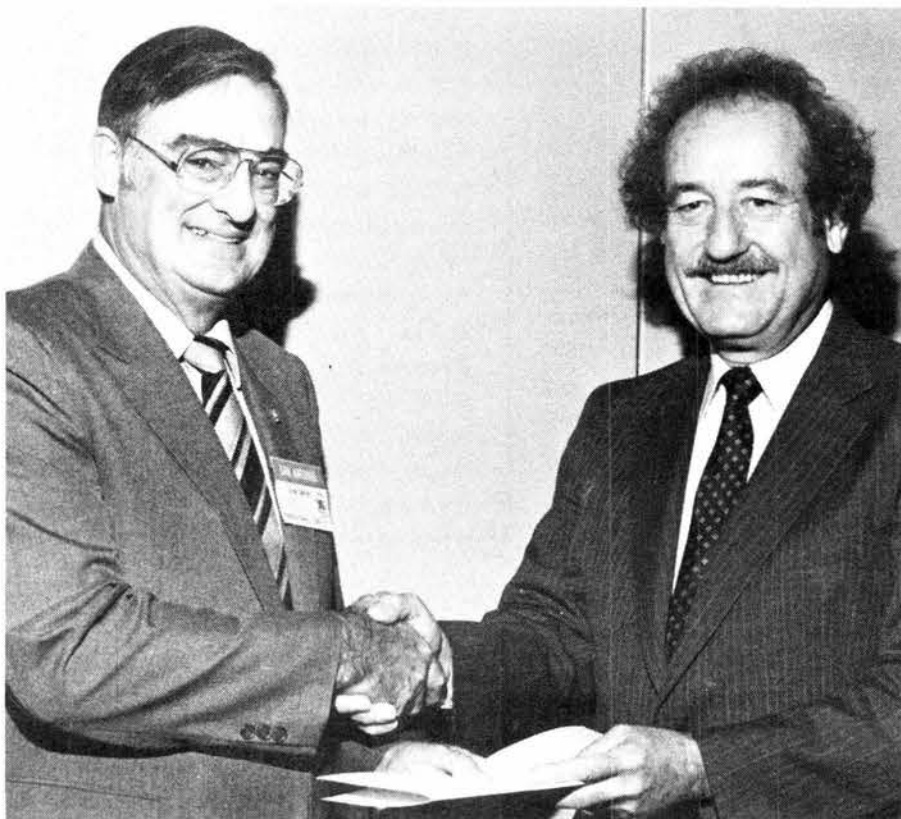
Eoin is the author or co-author of some 90 technical papers concerning discharge physics, photochemistry, reliability of electronic components, and insulator breakdown. He holds one U.S. patent on relay contacts. At age 31, he was elected a Fellow of the Institute of Physics, Great Britain, one of the youngest to receive the



EOIN GRAY (1261) was recently named a Fellow of the American Physical Society.

honor. He became a citizen of the United States in 1978.

In Albuquerque his leisure activities center on his two sons, age 11 and 13 — he is a single parent — and singing tenor in the St. John's Episcopal Cathedral Choir. He also plays a mean banjo, picking a five-string instrument in an Irish pub style. "Songs of the ould sod," he says. Eoin is looking for an Irish musical group needing a banjo and tenor.



Alan Swain Receives Human Factors Award

Alan Swain (7223), DMTS, received the Human Factors Society 1984 Jack A. Kraft Award for "significant efforts to extend the application of human factors principles and methods to new areas of endeavor." The award was presented to Alan at the Society's 28th Annual Meeting in San Antonio on Oct. 25.

The award recognizes Alan's work in the field of human reliability analysis, which has seen applications in the area of weapons

and nuclear power. Beginning in 1961, Alan developed theory, models, and methods for human reliability analysis for Sandia weapon programs. Since 1973, the approach has been applied to nuclear power plants. The latest publication on this subject, "Handbook of Human Reliability Analysis With Emphasis on Nuclear Power Plant Applications" (August 1973), was prepared by Alan and Hank Guttman (ret.) for the U.S. Nuclear Regulatory Commission.

HUMAN FACTORS SOCIETY'S most prestigious award went to Alan Swain (7223), left, this year. The award was presented by Harry Davis, incoming president of the society, at a ceremony during the group's annual meeting in San Antonio.